



17 January 2007  
HESI expert meeting

# Housing Earthquake Safety Initiative

**Shoichi Ando Dr.**

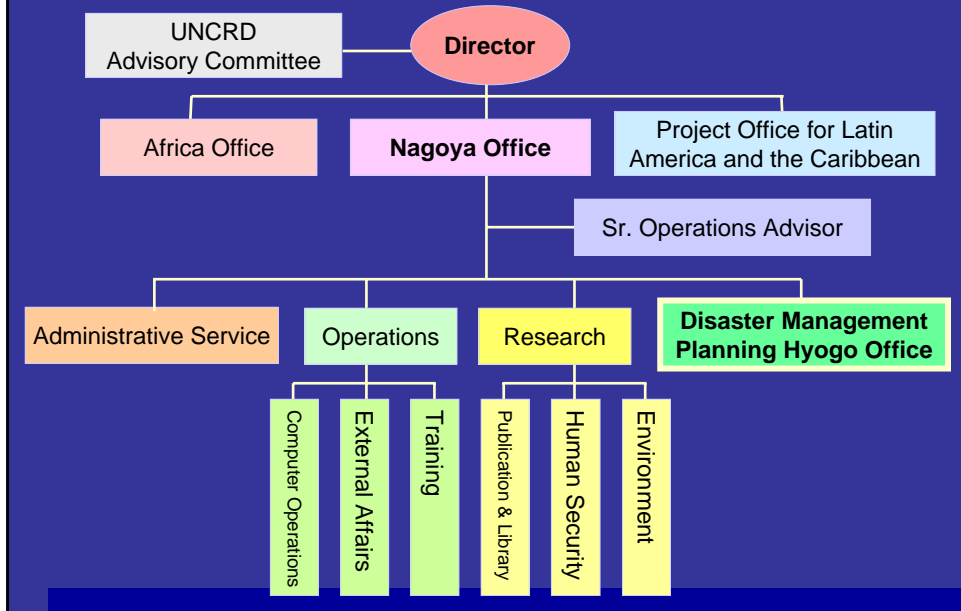
Coordinator  
Disaster Management Planning Hyogo Office  
**UNCRD**  
(United Nations Centre for Regional Development)

## Disaster Management Planning Hyogo Office

- Established in 1999, UNCRD was founded in 1971
- Kobe (Great Hanshin-Awaji) Earthquake, 17 Jan. 1995
- IDNDR (United Nations International Decade for Natural Disaster Reduction 1990-1999)
- WCDR (World Conference on Disaster Reduction, Kobe Jan. 2005) – Hyogo Framework for Action

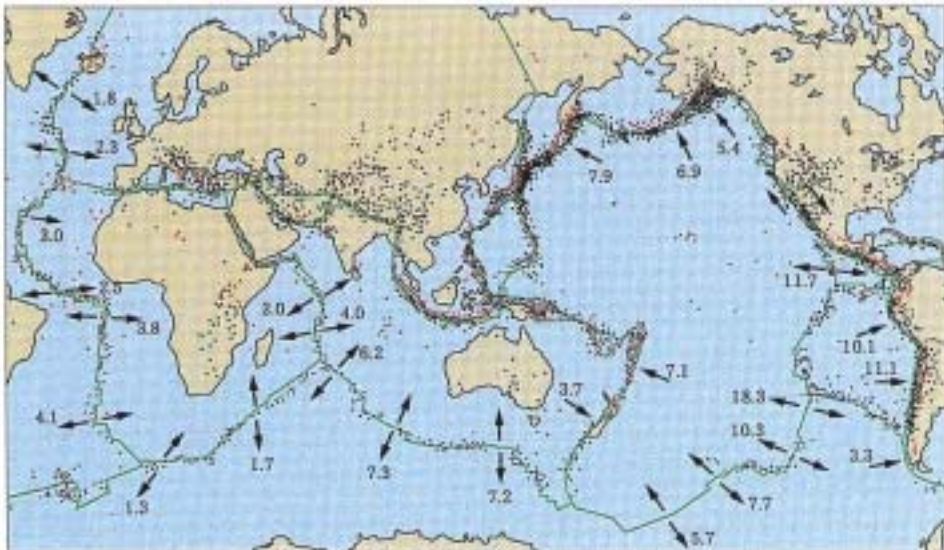


# Organizational Structure of UNCRD



## Housing and Building Damages by Earthquakes

Distribution of earthquakes that occur at plate boundaries



Source: Topography and geology of Japan

阪神大震災

Kobe **damaged** by the Great Hanshin-Awaji Earthquake (Jan. 17, 1995)

炎上する神戸市内

(「阪神、淡路大震災復興計画」神戸府政資料館蔵) 神戸市立中央図書館蔵



Kobe **damaged** by the Great Hanshin-Awaji Earthquake (1995)

Dead 6,434 persons

Kobe damaged by the Great Hanshin-Awaji Earthquake (1995)

Collapsed 104,906 units



Kobe damaged by the Great Hanshin-Awaji Earthquake (1995)

Collapsed 104,906 units



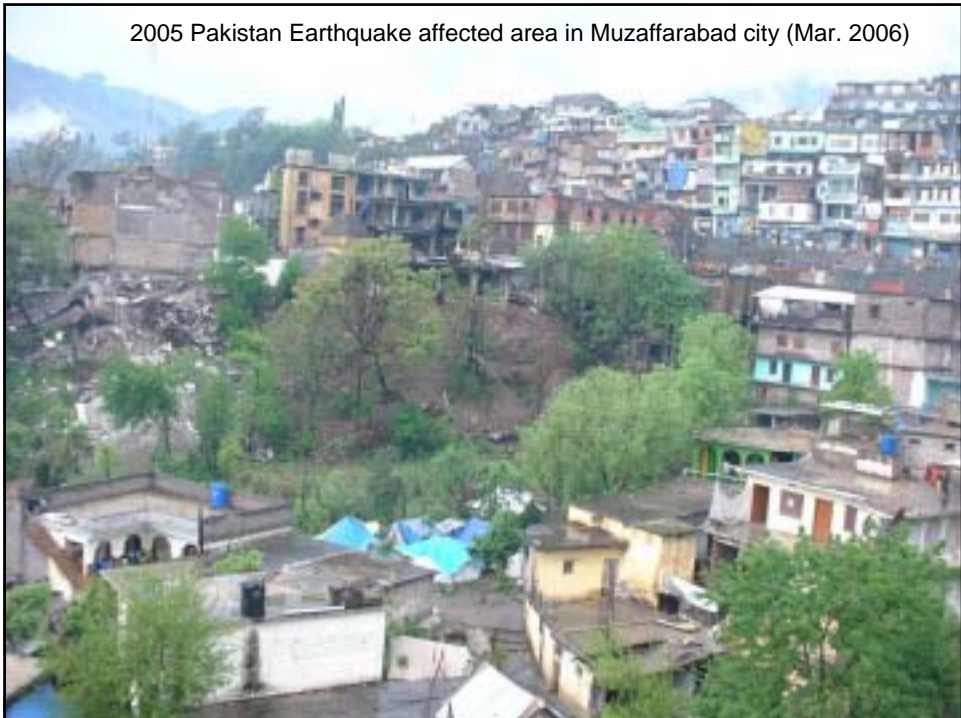
The buildings designed with old anti-seismic code (before 1980) were severely damaged.



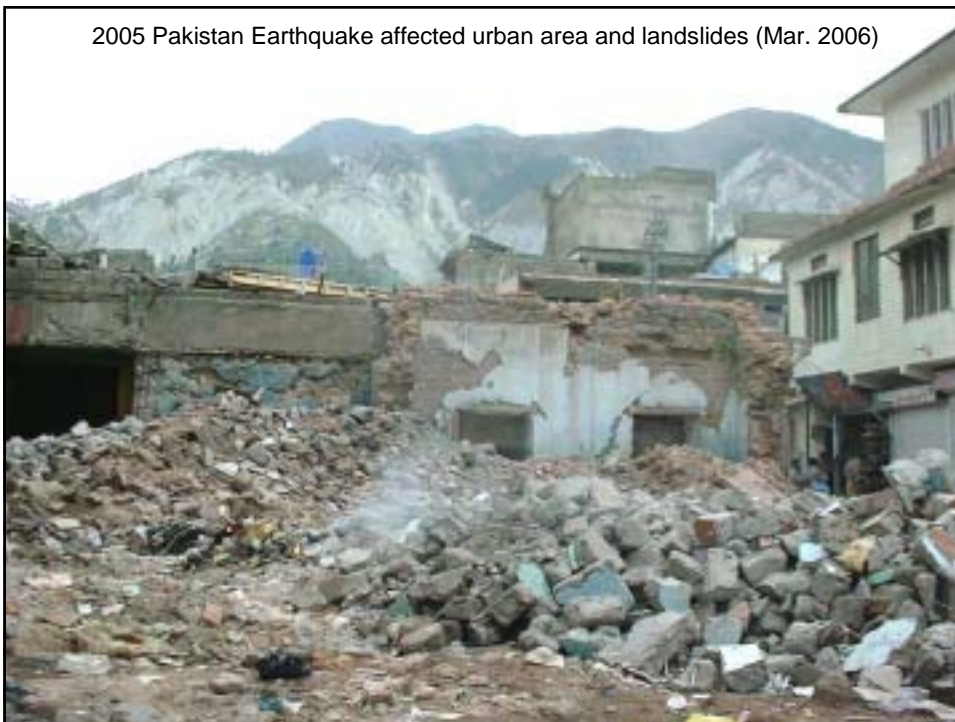
The Indian Ocean Tsunamis  
on Dec. 26, 2004



2005 Pakistan Earthquake affected area in Muzaffarabad city (Mar. 2006)



2005 Pakistan Earthquake affected urban area and landslides (Mar. 2006)



Totally collapsed urban area (Bararkot) by the Pakistan Earthquake in Oct. 2005

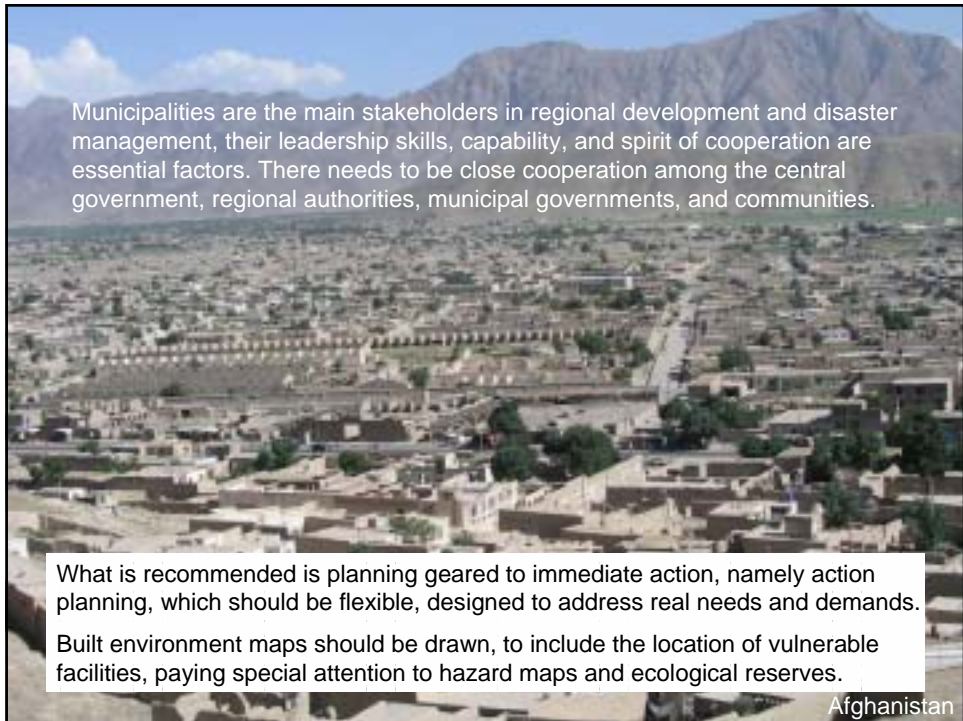




Disaster affected area (Yogyakarta) by the Java Earthquake in May 2006



Disaster affected area (Yogyakarta) by the Java Earthquake in May 2006



Municipalities are the main stakeholders in regional development and disaster management, their leadership skills, capability, and spirit of cooperation are essential factors. There needs to be close cooperation among the central government, regional authorities, municipal governments, and communities.

What is recommended is planning geared to immediate action, namely action planning, which should be flexible, designed to address real needs and demands.

Built environment maps should be drawn, to include the location of vulnerable facilities, paying special attention to hazard maps and ecological reserves.

Afghanistan

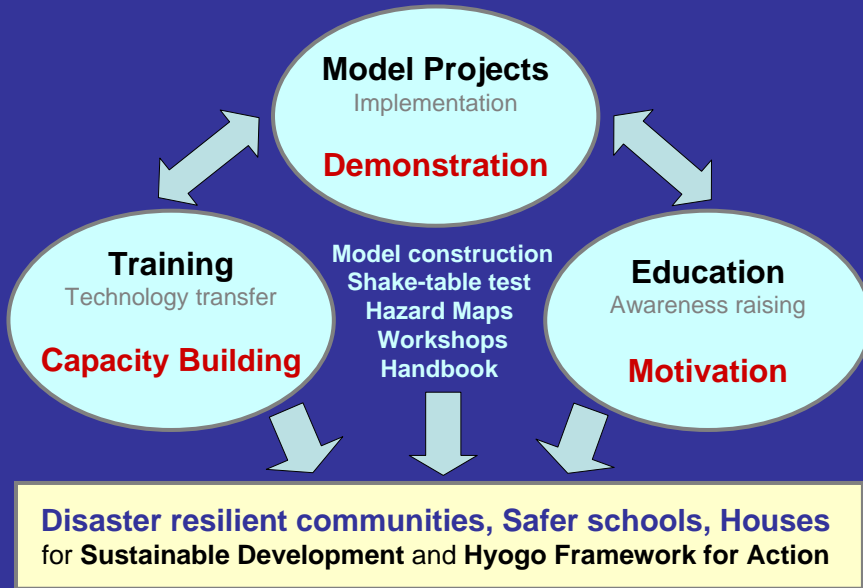


Indispensable buildings such as schools, hospitals, etc must be very carefully planned, in terms of location, design, construction, and maintenance, since those buildings play a crucial role during disasters: attending the injured, maintaining public order, and serving as a place of refuge for the victims.

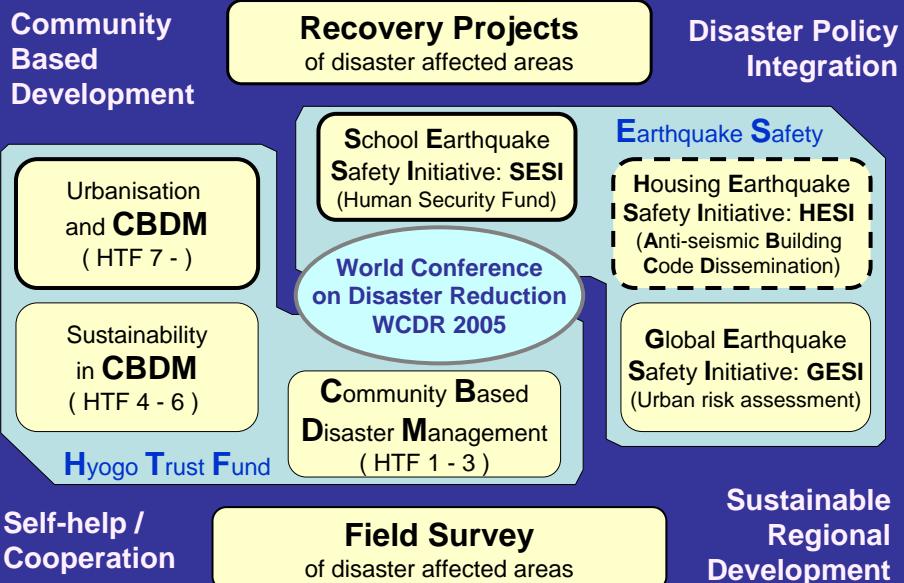
Afghanistan



# Objectives and Activities of UNCRD



# Projects (1999 - 2006) and Concepts



## Fields of Disaster Management by UNCRD Hyogo Office



## Housing Earthquake Safety Initiative



## Measures to Disseminate Indonesian Building Code

### Large-scale Buildings

(e.g. Condominium, Public building of reinforced concrete (RC), steel (S))

Engineered Construction

1. Amended Standards for Large-scale Buildings

### Small Buildings and Houses

(e.g. Detached house, Local school of brick, wood, other vernacular system)

Non-Engineered Construction

2. Developed Standards for Small Buildings and Houses

3. Capacity Building System for Local Building Officials

(for Municipalities)

4. Education and Certification Systems for Engineers

(for small houses)

5. Technical Review System for Engineered Buildings

6. Application of Standards to (Local) Public Buildings

7. Design Review System for Small Buildings and Houses

8. Socio-economic Measures to Promote Safer Buildings

9. Permission System of New and/or High Technology

11. Cooperation with related Research Institutes

10. Promotion System of New Technology for Houses

12. Dissemination System to Communities and Technicians

Development Schedule



indicates activities conducted mainly by local governments, while others are those by national government.

## “The Anti-seismic Building Code Dissemination project for the Housing Earthquake Safety Initiative (ABCD/HESI)” by UNCRD

This program is closely related and includes the following activities;

- (1) **Evaluate the former and current systems** related to anti-seismic building codes,
- (2) **Raise awareness of stakeholders**, including governments, academic institutions, NGOs and communities,
- (3) **Develop effective and efficient policies** on building code dissemination, and
- (4) **Build capacity of stakeholders** referring to evaluation and development of policies on building code dissemination.



# Policy Tools for Building Code Dissemination

by MLIT, UNCRD etc

- 1) **Administrative and financial institutions**, such as building permission charges by execution bodies;
- 2) **Research and development tools** for non-engineered houses and retrofitting of existing vulnerable buildings;
- 3) **License systems** for architects, engineers, building officials etc;
- 4) **Economic tools** including preferential housing loan systems linked to anti-seismic building codes;
- 5) **Voluntary tools** such as housing performance evaluation system; and
- 6) **Others** such as information policy, decentralization, deregulation, and role sharing among stakeholders.

## History of Designed Earthquake Forces in Japan

by Dr. Yuji Ohashi, BRI in 1995

**Seismic Coefficient Design Method** The Urban Building Law 1924

**Seismic force =  $K \times W$**   $K = 0.1$  (seismic coefficient)

**Allowable Stress Design Method** The Building Standard Law 1950

**Seismic force =  $Z \times G \times K \times W$**

$K = 0.2$  (seismic coefficient for buildings less than 16m in height, additional increment 0.01 per 4m for the building more than 16m in height)

**New Anti-seismic Design Method** The Building Standard Law 1980

Seismic story shear-force coefficient: **Co1 = 0.2** (1<sup>st</sup> design)  
**Co2 = 1.0** (2<sup>nd</sup> design)

**Seismic force =  $Z \times Ai \times Rt \times Co1 \times W$**   
(1<sup>st</sup> design, moderate earthquake)

**Seismic force =  $Z \times Ai \times Rt \times Fes \times Ds \times Co2 \times W$**   
(2<sup>nd</sup> design, big earthquake)